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AUTHOR Langer, Judith A.
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ABSTRACT

This paper draws on recent research findings in contending that starting with a student's "known" is a particularly sophisticated concept that, when understood both theoretically and practically, will permit teachers to help students read their texts with greater ease. It argues that students may have more prior knowledge about a topic than is readily apparent and that if their prior knowledge can effectively be tapped, a bridge between reader and text may be created that will result in more successful comprehension of text and, in addition, will aid in the gaining of new information from textbook reading. The paper then presents a prereading plan designed to access prior information and facilitate text processing through a three-step procedure that focuses on the development and assessment of conceptual language and organization related to major ideas expressed in a text. Examples are presented to show how the procedure may be used in the classroom. (FL)

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FACILITATING TEXT PROCESSING:

THE ELABORATION OF PRIOR KNOWLEDGE

Judith A. Langer
East Meadow Public Schools
New York University

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FACILITATING TEXT PROCESSING: THE ELABORATION OF PRIOR KNOWLEDGE

Judith A. Langer
East Meadow Public Schools
New York University

Included in almost every education course, lecture and textbook is the shibboleth to teachers that for efficient comprehension and new learning to take place, teachers must start with their student's "known" background of information or experiences. On the surface, this enjoinder may be considered to be either very sensible or very naive.

Well intended teachers who believe they start with what children already know as the base for instruction often attempt to adhere to this principle through overly simplistic techniques. For example, suppose a teacher wanted to introduce a textbook chapter about the nation's capitol. In order to create a bridge from what is known about Washington D.C. to a specific purpose for reading the chapter, this teacher might ask a general question such as "Has anyone ever visited Washington D.C.?" Too often, however, there is the only one child who has actually visited the nation's capitol, and while s/he tells about the trip, the teacher futilely attempts to engage other class members in discussion - and most of the students in the room remain cognitively uninvolved.

Those teachers who find the statement naive often feel that their students lack most of the basic experiences which bring relevant prior knowledge to the new task, and that the ideas or language expressed in textbooks are so far from their students experiences that the job of bridge building is almost impossible. The

apparent discrepancy between the language and ideas expressed in the text and the prior knowledge and expressive language of the students often creates major instructional problems for the teacher and major instructional problems for the student.

It is the thesis of this article that "starting with the student's "known" is a particularly sophisticated concept which, when understood both theoretically and practically, will permit the teacher to help students read their texts with greater ease. It will be argued that, in reality, students may have more prior knowledge about a topic than is readily apparent and that if their prior knowledge can effectively be tapped a bridge between reader and text may be created which will result in more successful comprehension of text and, in addition, will aid in the gaining of new information from textbook reading. How one activates and enables the student to use links between their knowledge of the topic and the text's topical content may make all the difference in comprehension and recall.

A brief presentation will be made of the theory and research which form the conceptual base of the instructional activity described in this article. The technique is designed to access prior information and facilitate text processing. A pre-reading plan will be presented which focuses on the development and assessment of conceptual language and organization related to major ideas expressed in a text. The link from theory and research to instructional implications will be demonstrated throughout the article.

BACKGROUND

In recent years, much research has focused on aspects of reader-author interaction which may impede comprehension of text. Some of the findings from this research suggest that the graphic representations in a text are only symbols and, in and of themselves, do not carry meaning. It is the reader's prior knowledge which permits anticipation and interpretation of the author's intended message and leads to comprehension of the textbook material. As the reader processes the ideas represented in the text, associations are formed in the mind of the reader which are perceived in light of this past meaning and their possible future integration with new ideas expressed in the text (Adams and Collins, 1979). New ideas and information are learned and retained most efficiently when particularly relevant ideas are already available within the reader's cognitive structures. Prior knowledge serves a subsuming role by furnishing "ideational anchorage" during new learning experiences (Ausubel, 1968). This leads us back to the student's "known" shibboleth and suggests that for efficient text processing and successful comprehension to take place, some sort of prior experience is necessary. And, it is this writer's contention that almost everyone knows something (however remote) about almost everything.

The assumptions underling this view of reading comprehension emanate from recent theory and research on memory which attempts to explain 1) how knowledge is organized and retrieved and, 2) how knowledge relates to reading comprehension, recall, and text processing. Since the organization of knowledge and retrieval

of information form the basis for comprehension and learning, a brief review of the ACT model of memory and schema theory will be presented, and the manner in which these theories can be utilized to expand the understanding of reader-text interaction will be explicated.

The ACT model (J. Anderson, 1973, 1976) differentiates between declarative knowledge and procedural knowledge - between knowing that and knowing how. The knowledge of a fact or truth is declarative knowledge while the doing of a skill or task is procedural knowledge. Declarative knowledge is described in terms of a propositional network and procedural knowledge is described in terms of productions. The propositional network is made up of a set of ideas or nodes connected by relationships or links between those ideas. The propositional network and productions interact to form cognition. Anderson suggests that all nodes, links, and productions are permanent once they have been formed and this implies that memory breakdowns are caused by inadequate retrieval rather than by the loss of stored knowledge. In recall, a frequently used link is more likely to be activated than one which is not used as often. Also, the greater the number of links leading to nodes, the greater the probability of recall.

From this brief description, it can be inferred that memory probes may encourage the activation of less used links leading to nodes, and this activation may in turn increase the use and strength of a particular set of links and nodes (Gagne, 1978). It appears then, that the events occurring during a pre-reading activity may effect the use of links leading to a particular

node, and may assist the student in accessing more conceptually appropriate and more highly elaborated prior knowledge which has been stored in memory. Pre-reading activities, then, may effectively be used by the teacher to help students approach the new reading task with activated prior knowledge, with more meaningful anticipations, and thus with greater cognitive readiness than had the pre-reading preparation not occurred.

Another large body of related research on the organization of knowledge and how knowledge relates to comprehension has been conducted which has increased our understanding of processing, comprehension, and recall based on interaction between the reader and the text. Studies have shown that the organization and accessing of knowledge influence the manner in which the reader organizes information provided by the author and affects the quality of the organization of that knowledge in recall. Rumelhart and Ortony (1977) postulated that knowledge is incorporated into abstract conceptual frameworks, or schemata. A schema is a metaphorical allusion and is meant to represent generic knowledge which may be based on common subject matter, attributes or associations. Schema theory suggests that text processing is reliant on the reader's past experiences and prior knowledge. It also describes the manner in which schemata have idiosyncratically been organized and structured, and explains how different kinds of prior knowledge affect retrieval of information and recall of text. Schemata represent what the reader already knows about a topic and help the reader to structure the interpretation of new messages about the topic (Anderson, Pichert, and Shirey, 1977; Anderson, Reynolds, Schallert, and Goetz, 1977).

Readers seem to make inferences consistent with their own schemata. Interpreting a situation or comprehending a text requires individuals to relate the elements in the event or text with the generic characterizations in their own schematic structure. Also, the organizational structure of knowledge facilitates learning and remembering of information (Anderson, Spiro, and Anderson, 1978), and may provide a plan which helps readers retrieve information (Pichert and Anderson, 1977).

Pearson (1979) conducted a study to learn if reading comprehension involves binding specific textual information to abstract schemata. If this were so, he hypothesized, then readers who have better developed schemata for a particular topic would understand and remember more than those with weaker schemata. Pearson's findings support the notion of comprehension as a process of integrating new information with preexisting schemata. If the schemata are weakly developed, comprehension requiring the integration of new and known information is difficult.

In a related study, Tannen (1979) found that anticipatory structures are based on past experience and these structures can be seen in the retelling of a passage. Furthermore, these structures of expectation which support the processing and comprehension of stories also serve to filter comprehension and influence recall. If the quality of the input is good, however, recall may still be poor due to inappropriate memory structures (Bobrow and Norman, 1975).

In order for readers to make full use of background knowledge as it applies to organizing and making sense of text, it is necessary for them to have a conscious awareness of how to orga-

nize that knowledge in relation to a specific text and its content. The work of Brown and Flavell provides the rationale for this assertion. Brown (1977) suggested that the executive processes of predicting, planning, checking, and monitoring are the basic characteristics of efficient thinking in learning situations. Executive monitoring involves evaluating and regulating one's own ongoing abilities and strategies. Metacognition (Flavell, 1976) refers to an individual's personal awareness of the cognitive processes or strategies used in learning. In deliberate learning, conscious executive control forms the core of intelligent activity. Metacognition is the more encompassing term under which more specific "meta" activities are subsumed. Here, metamemory and metacomprehension will be briefly described. Metamemory (Flavell, 1970) refers to the self awareness of working memory. Some form of knowledge or awareness of the workings of memory is necessary to help individuals supervise the strategies used and monitor the appropriateness of the ideas which are evoked. Metacomprehension permits learners to reflect on their own cognitive strategies when comprehending and, for example, to become aware of what they do and do not know (Brown, 1977). Executive monitoring in the form of these metacognitive awarenesses can lead the reader towards a deliberate search for and refinement of some ideas, rejection of others, and integration and adoption of still others.

From the discussion above, it can be generalized that teachers who wish to help their students comprehend the text as successfully as possible must help them to retrieve prior knowledge by creating conditions under which appropriately related

schemata are likely to be accessed. The accessing of related schemata permits a cognitive link with past experiences and allows the formulation of anticipations about the language and content presented in the text. It is by weighing, evaluating, and comparing the relationships of new and old information that comprehension of the author's message, refinement of ideas, and acquisition of new learning takes place. Sometimes students do lack adequate knowledge about the topic being presented, and therefore experience difficulty comprehending the text. However, often readers experience difficulty because they have not accessed appropriately related ideas, have not activated all available knowledge related to the topic, have not associated the information being presented in the text with their prior knowledge or because they have made the cognitive connection at a particularly low conceptual level due to insufficient concept organization.

Every learner, simply because of life's experiences, can almost always make some level of conceptual association or link with a new topic of study. What the original experiences were, how they are organized in memory, how frequently they have been activated, or how they are utilized in new learning situations varies from person to person. However, if teachers wish to facilitate more efficient comprehension of text, then they must provide experiences which permit students to access and evaluate as many relevant knowledge structures as possible. Teachers must: 1) provide a climate of inquiry which permits the student to activate prior knowledge, and 2) encourage discussion in an environment in which the student can evaluate the appropriateness of available ideas.

THE PREP

The Pre Reading Plan has been developed as a three step instructional/assessment paradigm for teachers to use before assigning textbook reading to their classes. It is an activity designed to facilitate the conscious accessing of knowledge related to major concepts presented in a text. It requires that readers be given the opportunity to access prior knowledge and encourages the elaboration and evaluation of appropriately related accessed ideas. The assessment aspect of the procedure assists the teacher in: 1) determining the amount of prior knowledge a student possesses about a specific topic, as well as the manner in which this knowledge is organized; 2) becoming aware of the conceptual language a student uses to express knowledge about a given topic; and 3) making judgments about how much additional background information must be taught before the student can successfully read the text. The instructional aspect of the procedure: 1) permits students to know what they already know about a topic; 2) elicits group interaction which provides the environment for elaboration of existing language and concepts; and 3) permits refinement of concept anticipations to take place which, in turn, facilitates the processing of and learning from text.

The PReP calls for a group discussion before students are expected to read the text. The teacher must carefully review the portion of the text to be assigned for reading and select a word, a phrase, or a picture which will be used to stimulate group discussion about a key concept dealt with in the text. There are three phrases to the lesson:

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I) The teacher asks: Tell anything that comes to mind when ... (you hear this word, see this picture, etc.). After each student has freely associated and told what ideas initially came to mind, and the teacher has jotted these responses on the board, the teacher then asks each individual:

II) What made you think of ... (the response given by each of the students during Phase I). After each student has had an opportunity to think about and tell about what triggered those ideas, the teacher then says:

III) Based on our discussion, have you any new ideas about ... (the word, the picture, etc.).

The purpose of this three phase lesson is to help both teachers and students become aware of and assess what the students already know about a concept and to permit the students to organize and refine anticipations about the concepts to be read in the text. Students are encouraged to probe for as many links as possible about a given idea, and may even have the opportunity to formulate additional links as a result of the group discussion. It is particularly important that the teacher not impede the students in accessing memory units which may be in the students' concept structure, but may not be in the teacher's.

Phases I and III elicit "free association" responses whereas Phase II elicits a metacognitive explanation.

There seem to be three levels of responses that students verbalize during Phase I and III based on the amount and organization of their prior knowledge. Categorization of knowledge into the levels described below will provide the teacher with diagnostic information which is particularly useful for planning instruction.

- -

Insert Figure 1 about here

- -

If the student has much prior knowledge about the concept being discussed, the responses to the question "Tell me anything that comes to mind when ..." generally take the form of superordinate concepts, definitions, analogies, or a linking of that concept with another concept to show evidence of high level integration of ideas. If the student has some knowledge about the concept being discussed, the response to the stimulus generally takes the form of examples, attributes, or defining characteristics. If the student has little prior information about the concept, the response generally focuses on such low level associations as morphemes (prefixes, suffixes or root words), words which sound like the stimulus word, or first hand experiences which are often particularly recent.

A group of fifth graders were shown a picture of a courtroom scene. When they were asked to tell what came to mind when they saw the picture, the following responses were given. (Student responses and their corresponding levels are shown in Figure 2.) Phases I, II, and III are indicated by the appropriate Roman numerals. Note that levels are assigned only for responses elic-

ited during Phase I and III. The levels assigned to each of

- -

Insert Figure 2 about here

- -

the responses focus on the type of organization utilized by the student. For example, during Phase I and II Bob seems to rely leavily on associations or possible firsthand experiences. However, as a result of discussion and the metacognitive activity, he had the opportunity to activate a greater number of memory links which then permitted more sophisticated concept decisions as can be seen in his Phase III response. Alice, on the other hand, seems to be working at an association or firsthand experience level and has not conceptually benefitted from the Phase II discussion in terms of text related readiness. Here, there is no evidence of concept growth from Phase I to Phase III. Based on this quick analysis, the teacher might determine that Bob can be expected to comprehend the social studies chapter dealing with the American judicial system and is ready for the textbook assignment, whereas Alice requires specific concept instruction prior to the assignment of text reading.

It is important that a student who responds at the <u>little</u> prior knowledge level during Phase I be given an opportunity to explain why the response came to mind. For example, Dan responded with associations during Phase I. However, during the Phase II metacognitive activity, he said "the jury will tell if you're guilty or not". This verbalized awareness, as well as the discussion which took place, may have permitted this student to critically select appropriate prior knowledge, access related concept links, and then respond at a higher level during Phase III

when he stated a rationale for a trial by one's peers. This student at the same level during Phase III may now be ready to successfully engage in textbook reading. However, it might be best if the teacher kept close watch should assistance, in the form of discussion and concept elaboration become necessary.

Responses in the much and some categories generally indicate that the student is likely to read the text with adequate comprehension. However, students at the some level may need a bit of teacher guidance, often in the form of probing questions. Students responding at the little level will most likely require direct concept instruction before they can successfully comprehend that portion of the text.

Based upon this three part pre-reading activity, teachers often gain important diagnostic information about the group's readiness to read the text with comprehension. The following chart (see figure 3) may be useful in helping the teacher to organize student responses for purposes of identifying those students who are not likely to benefit from textbook reading without first participating in direct concept instruction.

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Insert Figure 3 about here

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SUMMARY

The Pre-Reading Plan is an assessment/instructional activity which benefits both teachers and students. The teachers become aware of 1) the levels of concept sophistication possessed by the individuals in the group; 2) the language the students have available to express their knowledge about the topic,

and 3) how much concept instruction is necessary before textbook reading can be assigned. Students are given the opportunity to: 1) strengthen their information base via the elaboration of prior knowledge; 2) become more aware of their own related knowledge; and 3) anticipate the concepts to be presented in the text. The elaboration of prior knowledge, the awareness of what is "known" about a topic, and the expectation about the content and language to be presented in the text are all functions of the utilization of prior knowledge which lead to more efficient processing and recall of the subject area text.

References

Adams, M. J. and Collins, A. A schema theoretic view of reading. New Directions in Discourse Processing, Vol. II, Roy O. Freedle, Ed. Pp. 1-21. Norwood, New Jersey: Ablex, 1979.

Anderson, J. R. Language, memory and thought. Hillsdale, New Jersey: Lawrence Erlbaum Assoc., 1976.

Anderson, J. R. & Bower, G. H. Human associative memory. Washington, D.C.: Winston, 1973.

Anderson, R. C., Pichert, J. W., and Shirey, L. L. Effects of the reader's schemata at different points in time. Center for the Study of Reading Technical Report No. 119, April, 1979.

Anderson, R. C., Reynolds, R. D., Schallert, D. L. and Goetz, E. T. Frameworks for comprehending discourse. American Educational Research Journal, 1977, 14, 367-381

Anderson, R. C., Spiro, R. J., and Anderson, M. C. Schemata as scaffolding for the representation in connected discourse. American Educational Research Journal, 1978, 15, 3, 433-440

Ausubel, D. P. Educational psychology: a cognitive view. New York: Holt, Rinehart & Winston, 1968.

Bobrow, D. G., and Norman, D. A. Some principles of memory schemata. In D. G. Bobrow and A. Collins (Eds.), Representation and understanding: Studies in cognitive science. New York: Academic Press, 1975.

Brown, A. Knowing when, where, and how to remember: a problem of metacognition. Center for the Study of Reading Technical Report No. 47. June, 1977.

Flavell, J. H. Developmental studies of mediated memory. In H. W. Reese & L. P. Lipsitt (Eds.), Advances in child development and child behavior (Vol. 5). New York: Academic Press, 1970. Pp. 181-211.

Flavell, J. H. Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), The nature of intelligence. Hillsdale, New Jersey: Lawrence Erlbaum Assoc., 1976.

Gagne, E. D. Long-term retention of information on following learning from prose. Review of Educational Research, 1978, 48, 4, 629-665.

Pearson, P. D., Hansen, J. D., and Gordon, C. The effect of background knowledge on young children's comprehension of explicit and implicit information, Center for the Study of Reading Technical Report No. 116, March, 1979.

Pichert, J. W., and Anderson, R. C. Taking different perspectives on a story. Journal of Educational Psychology, 1977, 69, 309-315.

Rumelhart, D. E. and Ortony, A. The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro, and W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, New Jersey: Lawrence Erlbaum Assoc., 1977. Pp. 99-135.

Tannen, D. What's in a frame? Surface evidence for underlying expectations. In R. O. Freedle (Ed.), New directions in discourse Processing, Vol. II. Norwood, New Jersey: Ablex, 1979. Pp. 137-181.

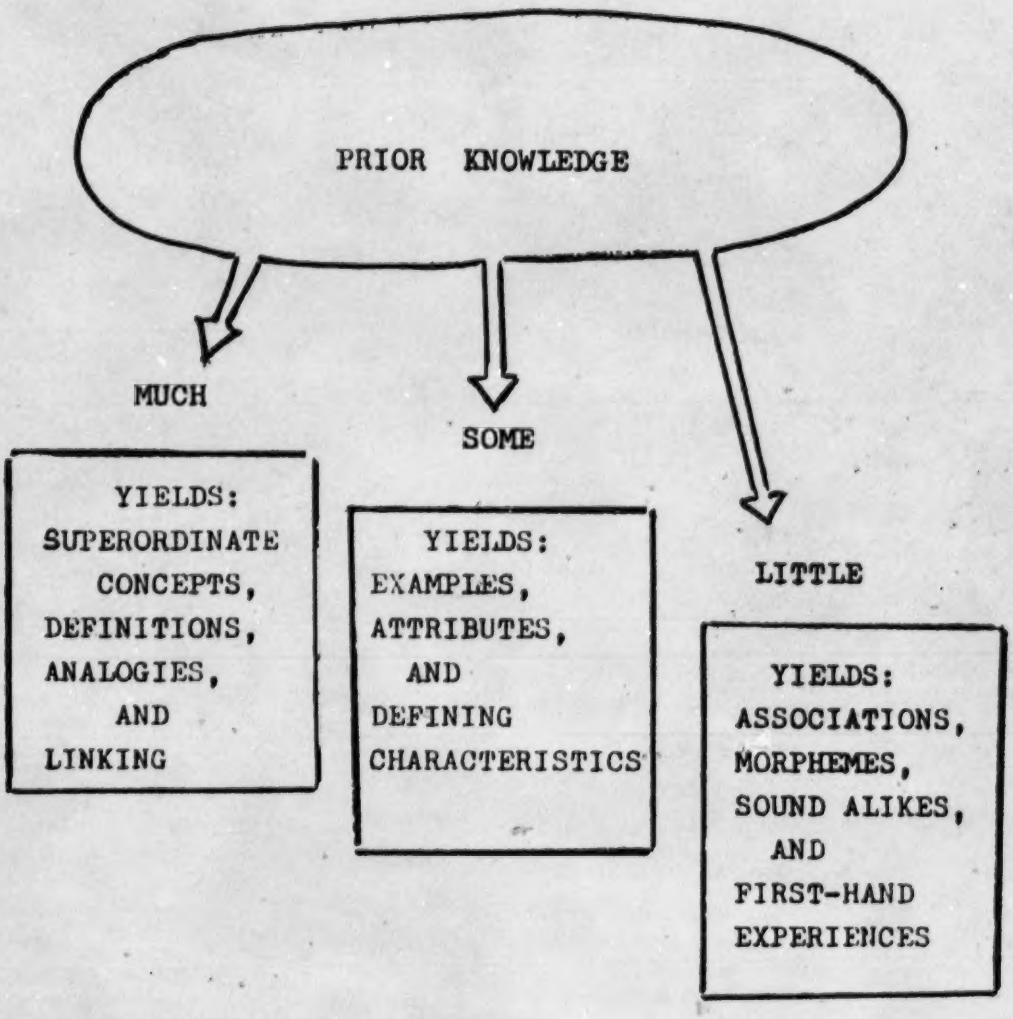
PRIOR KNOWLEDGE
MUCH
SOME
LITTLE
YIELDS: SUPERORDINATE CONCEPTS, DEFINITIONS, ANALOGIES, AND LINKING
YIELDS: EXAMPLES, ATTRIBUTES, AND DEFINING CHARACTERISTICS
YIELDS: ASSOCIATIONS, MORPHEMES, SOUND ALIKES, AND FIRST-HAND EXPERIENCES

Figure 1

COURTROOM SCENE

STUDENT		RESPONSES	LEVEL
Alice	I	person in court, lawyer, judge and stuff	little - association
	II	someone would be guilty, people can't get out innocent	
	III	person might have to go to jail or pay a fine	little - association
Bob	I	trial and being divorced	little - association
	II	when people get divorced they have to go to court	
	III	court stands for "obey the law and don't commit crimes"	much - superordinate
Carol	I	court and judge	little - association
	II	knew judge was in court	
	III	means justice	some - defining characteristic
Dan	I	lawyer, judge and jail	little - association
	II	jury will tell if they're guilty or not	
	III	trust in one another's judgment when you have a jury	some - attribute

Figure 2
Sample Responses Elicited During Phase I, II, and III of PReP

PRE-READING PLAN RESPONSE CHECKSHEET

PHASE I - What comes to mind when ...
PHASE II - What made you think of ...
PHASE III - Have you any new ideas about ...

STIMULUS _____ (note word, picture, or phrase)	MUCH superordinate concepts, definitions, analogies, linking		SOME examples, attributes, defining characteristics		LITTLE morphemes, sound alikes, recent experiences	
Student Names	I	III	I	III	I	III
1. _____						
2. _____						
3. _____						
4. _____						
5. _____						
6. _____						
7. _____						
8. _____						
9. _____						
10. _____						

Figure 3